



## WORD EQUATIONS QUIZ-Answer Key

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1. What is a chemical equation?

**A chemical reaction is a process by which reactants change to products while a chemical equation is a representation of a reaction using symbols and formulae.**

2. Distinguish between chemical reaction and chemical equation

**A chemical reaction is a process by which reactants change to products while a chemical equation is a representation of a reaction using symbols and formulae.**

3. In a word equation **reactants** are written on the left-hand side of the arrow while **products** are written on the right-hand side.

4. State two limitations of word equations

- **They don't indicate the quantities of substances involved in the reaction.**
- **Can lead to verbosity or excessive detail.**

5. Write word equations for each of the following chemical reactions:

- a. Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.

**Sodium phosphate + calcium chloride → calcium phosphate + sodium chloride.**

- b. Calcium carbonate combines with hydrochloric acid to produce calcium chloride, water, and carbon dioxide gas.

**Calcium carbonate + hydrochloric acid → calcium chloride + water + carbon dioxide gas.**

- c. When sodium metal reacts with iron (II) chloride, iron metal, and sodium chloride is formed

**Sodium + iron (II) chloride → Iron + sodium chloride**

- d. Aluminum and hydrochloric acid react to form aluminum chloride and hydrogen gas.

**Aluminum + hydrochloric → Aluminum chloride + hydrogen gas.**

- e. When dissolved sodium hydroxide reacts with sulphuric acid, aqueous sodium sulphate, and water are formed.

**Sodium hydroxide + sulphuric acid → Sodium sulphate + water**

- f. When calcium chloride and potassium phosphate are dissolved in water they react to form aqueous potassium chloride and calcium phosphate powder.

**Calcium chloride + potassium phosphate → Potassium chloride + calcium phosphate.**

- g. Potassium manganate (VII) breaks down on heating to form potassium manganite (VI), manganese (IV) oxide and oxygen.

**Potassium manganate (VII) → Potassium manganite (VI) + manganese (IV) oxide + oxygen.**

- h. Aluminum sulphate solution and calcium hydroxide solution produce a precipitate of aluminum hydroxide and solid calcium sulphate.

**Aluminum sulphate + Calcium hydroxide → Aluminum hydroxide + calcium sulphate.**

- i. Silicon dioxide solid reacts with aqueous hydrofluoric acid to produce solid silicon tetrafluoride plus liquid water.

**Silicon dioxide + Hydrofluoric acid → Silicon tetrafluoride + water.**

- j. When dissolved beryllium chloride reacts with dissolved silver nitrate in water, aqueous beryllium nitrate and silver chloride powder are produced.

**Beryllium chloride + Silver nitrate → Beryllium nitrate + silver chloride**

- k. Zinc oxide turned to a yellow solid on heating and then back to the original white solid on cooling.

**Solid zinc oxide  $\rightleftharpoons$  Solid zinc oxide**

**6. Write a word equation to show the reactions that occur in the following scenarios:**

- a. Acid spills can be neutralized with baking soda by applying baking soda to the spilled acid. The baking soda, which is a base (sodium bicarbonate), reacts with the acid to form water and a salt, thus neutralizing the acidic solution and making it safer to clean up.

**Baking Soda (Sodium Bicarbonate) + Acid → Water + Salt**

- b. A lab technician heated some solid ammonium chloride in a test tube. The solid ammonium chloride changed directly to white vapor without passing through the liquid phase. The vapor changed back to solid ammonium chloride on the upper, cooler parts of the test tube.

**Solid ammonium chloride  $\rightleftharpoons$  Gaseous ammonium chloride**

- c. When we run, our muscles use up glucose. The reaction requires oxygen and the glucose breaks down to produce carbon dioxide and water.

**Glucose + oxygen → carbon dioxide + water**

- d. Hydrolysis of salt occurs when sodium chloride (table salt) reacts with water to produce sodium hydroxide and hydrochloric acid.

**Salt (Sodium Chloride) + Water → Sodium Hydroxide + Hydrochloric Acid**

- e. Making vinegar involves fermenting alcohol, mainly from fermented fruits or grains, with acetic acid bacteria. During fermentation, the acetic acid bacteria convert the alcohol into acetic acid, resulting in the formation of vinegar, along with carbon dioxide and water as byproducts.

**Ethanol + Acetic Acid → Vinegar + Carbon Dioxide + Water**

- f. Chalk reacts with hydrochloric acid to release carbon dioxide gas. Salt and water also result.

**Calcium carbonate (Chalk) + hydrochloric acid → Salt + Carbon dioxide + Water.**

- g. When an antacid, typically containing calcium carbonate, interacts with stomach acid (hydrochloric acid), it undergoes a neutralization reaction. This process results in the formation of calcium chloride, water, and carbon dioxide, which helps alleviate symptoms of acidity by neutralizing excess stomach acid.

**Calcium carbonate + hydrochloric acid → Calcium chloride + water + carbon dioxide**

- h. A catalytic converter in a car exhaust uses oxygen from the air to change toxic carbon monoxide into less harmful carbon dioxide.

**Carbon monoxide + oxygen → carbon dioxide**

- i. Tarnish in metal surfaces can be removed by applying lemon juice, which contains citric acid, to the tarnished surface. The citric acid reacts with the silver sulfide (tarnish) to form silver citrate, hydrogen sulfide, and water. This effectively dissolves the tarnish and restores the shine to the surface.

**Citric Acid + Silver Sulfide → Silver Citrate + Hydrogen Sulfide + Water**

- j. A group of students prepared hydrogen gas in the lab by reacting calcium metal with dilute hydrochloric acid.

**Calcium metal + dilute hydrochloric acid → Calcium chloride + Hydrogen gas**

- k. Rust removal with vinegar involves immersing the rusty object in vinegar, which contains acetic acid. The acetic acid reacts with the iron oxide (rust) to form iron acetate and water, effectively dissolving the rust and facilitating its removal from the surface.

**Acetic Acid (Vinegar) + Iron Oxide (Rust) → Iron Acetate + Water**

- l. Blue crystals of hydrated copper (II) sulphate decompose on heating into anhydrous copper (II) sulphate (white powder) and water. The reaction is a reversible reaction.

**Hydrated copper (II) sulphate  $\rightleftharpoons$  anhydrous copper (II) sulphate + water.**

- m. The thermite process is used to weld railway lines. In the reaction iron metal is produced when aluminum reacts with iron oxide at high temperature. Aluminum oxide is also made in the reaction.

**Iron oxide + Aluminum → Iron + Aluminum oxide**

- n. Esters are organic compounds that we often use to flavor our foods and drinks. One of the most common flavors used in the boiled sweet, pear

drops, is referred to as pentyl ethanoate. It is produced by reacting pentanol with ethanoic acid. Water is released in the reaction.



- o. The process of water treatment with chlorine involves adding chlorine gas to water to disinfect it and kill harmful microorganisms. The chlorine gas reacts with water to form hypochlorous acid and hydrochloric acid, which effectively sterilizes the water.

